L17: Entry 1 of 18 File: USPT Mar 29, 2005

US-PAT-NO: 6873888
DOCUMENT-IDENTIFIER: US 6873888 B2

TITLE: Method and system for improving acceleration rates of locomotives

DATE-ISSUED: March 29, 2005

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Kumar; Ajith Kuttannair	Erie	PA		

US-CL-CURRENT: 701/19; 701/20

ABSTRACT:

In a railroad locomotive having a diesel engine and an electro-motive propulsion system for transforming and transmitting power from the engine to wheels of the locomotive for propelling the locomotive, a method of reducing the time required to transmit power at a predetermined level of power to the wheels to propel the vehicle comprising increasing engine speed to approximately a maximum engine speed prior to transmitting power generated by the engine to propel the locomotive, and thereafter controlling the electro-motive propulsion system to transfer power from the engine to the locomotive wheels to propel and accelerate the locomotive.

32 Claims, 18 Drawing figures
Exemplary Claim Number: 21
Number of Drawing Sheets: 17

L17: Entry 2 of 18 File: USPT Mar 1, 2005

US-PAT-NO: 6862502
DOCUMENT-IDENTIFIER: US 6862502 B2

TITLE: Intelligent communications, command, and control system for a land-based vehicle

DATE-ISSUED: March 1, 2005

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Peltz; David M.	Melbourne	FL		
Smith; Eugene A.	Satellite Beach	FL		
Kraeling; Mark	Melbourne	FL		
Foy; Robert James	Melbourne	FL		
Peltonen; Glen Paul	Melbourne	FL		
Kellner; Steven Andrew	Melbourne	FL		
Bryant; Robert Francis	Palm Bay	FL		
Johnson; Don Keith	Palm Bay	FL		
Delaruelle; Dale Henry	Melbourne	FL		

US-CL-CURRENT: 701/19; 246/187C

ABSTRACT:

Method and communication system for a railroad train having at least one locomotive for automatically adjusting the communication system to provide effective communication of command data to control operation of the locomotive are provided. The system includes a transceiver on the locomotive. The system further includes at least one transceiver remote from the locomotive. A database may be provided for storing data relative to a plurality of communication schemes available to the communication system. A first monitor may be used for sensing a parameter indicative of the quality of the communications between the transceivers when the transceivers are operating under a first one of the available communication schemes and generating data indicative of communications quality. A processor in communication with the monitor and the database may be configured to select a second communication scheme when the quality of the communications provided by the first communication scheme is not satisfactory to ensure that the command data will be reliably communicated with respect to the locomotive.

61 Claims, 5 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 5

L17: Entry 3 of 18 File: USPT Aug 17, 2004

US-PAT-NO: 6778097
DOCUMENT-IDENTIFIER: US 6778097 B1

TITLE: Remote radio operating system, and remote operating apparatus, mobile relay station and radio mobile working machine

DATE-ISSUED: August 17, 2004

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Kajita; Shigeo	Tokyo			JP
Awano; Katsusuke	Tokyo			JP
Tozawa; Shoji	Tokyo			JP
Nishikawa; Hiroyasu	Tokyo			JP
Miki; Masatoshi	Tokyo			JP

US-CL-CURRENT: 340/825.69; 340/679, 340/683, 342/426, 455/15, 701/2, 701/50

ABSTRACT:

The present invention relates to remote radio control technology, and a remote radio control system includes a radio movable working machine (1), a remote control apparatus (6A), and a movable repeater station (7). First bidirectional communication means (31, 71) having a high radio wave directionality and first automatic tracking means (32, 71A) are provided between the working machine (1) and the repeater station (7), and second bidirectional communication means (63, 76) having a high radio wave directionality, second automatic tracking means (63A, 76A), and emergency spread spectrum bidirectional communication means (64, 87) for enabling bidirectional communication between the remote control apparatus (6A) and the repeater station (7) when communication by the second bidirectional communication means (63, 76) is impossible are provided between the remote control apparatus (6A) and the repeater station (7). Consequently, even if communication between the working machine (1) and the movable repeater station (7) is disabled, each of the working machine (1) and the repeater station (7) is permitted to perform a minimum necessary operation, and any other person than those skilled in actual controlling operation of the working machine (1) can perform remote control easily.

41 Claims, 25 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 24

L17: Entry 4 of 18 File: USPT Nov 18, 2003

US-PAT-NO: 6650993
DOCUMENT-IDENTIFIER: US 6650993 B2

TITLE: Automatic start/stop system and method for locomotive engines

DATE-ISSUED: November 18, 2003

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Wolf; Daniel F.	Erie	PA		
Hess, Jr.; Gerald James	Erie	PA		
Twichel; Jeffrey A.	Girard	PA		

US-CL-CURRENT: 701/112; 123/179.4, 701/114, 701/115

ABSTRACT:

An automatic start/stop system for locomotive engines which takes into account operator needs and concerns by enabling operators to locally prevent automatic shutdowns of their locomotives without disabling their AESS systems. Thus, operators can maintain their lead (and/or other) units running (i.e., for peace of mind, climate control, etc.) without prohibiting other locomotives in consist from automatically shutting down. The system preferably includes an inhibit switch located in each locomotive control cabin which, when actuated by an operator, prevents that locomotive (and only that locomotive) from automatically shutting down within a predefined duration of time. Techniques for reminding and prompting an operator to enable an AESS system include sounding an alarm, displaying and recording fault data, and inhibiting motoring of the locomotive when the AESS system is disabled and the operator calls for braking or motoring capability.

29 Claims, 2 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 2

L17: Entry 5 of 18 File: USPT Apr 1, 2003

US-PAT-NO: 6542794
DOCUMENT-IDENTIFIER: US 6542794 B2

TITLE: Technique for effectively communicating information concerning vehicle service providers to a user

DATE-ISSUED: April 1, 2003

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Obradovich; Michael L.	San Clemente	CA		

US-CL-CURRENT: 701/1; 340/438, 340/457, 340/457.4, 701/29, 701/30, 701/31, 702/183, 702/184

ABSTRACT:

In a multimedia information and control system for use in an automobile, at least one interface is employed which enables a user to access information concerning the automobile and control vehicle functions in an efficient manner. The user may select one of a plurality of displayed options on a screen of such an interface. Through audio, video and/or text media, the user is provided with information concerning the selected option and the vehicle function corresponding thereto. Having been so informed, the user may activate the selected option to control the corresponding vehicle function.

37 Claims, 24 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 17

L17: Entry 6 of 18 File: USPT Dec 10, 2002

US-PAT-NO: 6493619
DOCUMENT-IDENTIFIER: US 6493619 B2

TITLE: Lane keeping assistance system and method for automotive vehicle

DATE-ISSUED: December 10, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Kawazoe; Hiroshi	Kanagawa			JP
Shimakage; Masayasu	Kanagawa			JP
Sadano; On	Kanagawa			JP
Sato; Shigeki	Kanagawa			JP

US-CL-CURRENT: 701/41; 180/168, 340/435, 701/117, 701/118, 701/223, 701/28, 701/96

ABSTRACT:

In lane keeping assistance system and method for an automotive vehicle, a control current (Iout) to be outputted to a motor during an automatic steering mode is detected, a filter is provided for the detected control current to pass only signal components of the detected control current whose frequencies are lower than a predetermined cut-off frequency value (fstr, fstr_low, fstr_mid, fstr_hi) to derive a filtered control current (Iout_lpf), a determination of whether a manual steering intervention to the automatic steering occurs is made according to a magnitude of the filtered control current, and the control current outputted to the motor is reduced toward zero when the manual steering intervention is determined to occur according to a result of determination that the magnitude of the filtered control current (Iout_lpf) is in excess of a predetermined threshold current value (Iout_lpf_th).

11 Claims, 13 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 9

L17: Entry 7 of 18 File: USPT Nov 19, 2002

US-PAT-NO: 6484077
DOCUMENT-IDENTIFIER: US 6484077 B1
**** See image for Certificate of Correction ****

TITLE: Mobile vehicle travel control system

DATE-ISSUED: November 19, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Unose; Noriyuki	Saitama			JP
Inoue; Eiichi	Saitama			JP
Nakazono; Yoshiharu	Saitama			JP
Minato; Muneatsu	Saitama			JP
Yamamuro; Hideya	Saitama			JP

US-CL-CURRENT: 701/24; 701/19, 701/33

ABSTRACT:

An assembly carrying vehicle running control system, includes a plurality of assembly carrying vehicles, a control apparatus, and a plurality of access points connected with said control apparatus and provided for said plurality of assembly carrying vehicles. Each of the plurality of access points has a communication area. When each of the plurality of assembly carrying vehicles is individually in the communication area of a currently communicating access point of the plurality of access points, the assembly carrying vehicle transmits an operation status data indicative of an operation status to the control apparatus through the currently communicating access point. The control apparatus determines an operation control instruction based on the operation status data to transmit to the assembly carrying vehicle. The assembly carrying vehicle receives the operation control instruction from the control apparatus through the currently communicating access point such that an operation of the assembly carrying vehicle is controlled based on the operation control instruction.

58 Claims, 23 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 21

L17: Entry 8 of 18 File: USPT Jul 16, 2002

US-PAT-NO: 6418854
DOCUMENT-IDENTIFIER: US 6418854 B1
**** See image for Certificate of Correction ****

TITLE: Priority car sorting in railroad classification yards using a continuous multi-stage method

DATE-ISSUED: July 16, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Kraft; Edwin R.	Frederick	MD	21703	

US-CL-CURRENT: 104/26.1

ABSTRACT:

A new method of sorting railroad cars in yards is presented, whereby outbound trains are built in proper standing order for departure directly on classification tracks, using a continuously sustainable multi-stage sorting process. During this process, cars are easily separated based on priority or according to their delivery time commitments, so connections of cars needing to go on a specific train can be protected. During second stage sorting operations, railcars may be inspected or repaired while they await outbound connections on classification tracks, effectively utilizing otherwise idle time and resulting in considerable savings in time required for railcars to pass through the yard. The need for a separate departure yard, along with the bottleneck "flat" switching operation at the departure end of the classification yard, is also eliminated. This sorting process may be implemented in a traditional rail yard setting, but it will yield even more benefit if accomplished in one of the specialized facility designs shown in the drawing figures.

32 Claims, 64 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 46

L17: Entry 9 of 18 File: USPT Apr 9, 2002

US-PAT-NO: 6370471
DOCUMENT-IDENTIFIER: US 6370471 B1
** See image for Certificate of Correction **

TITLE: Automatic following guidance system for motor vehicles

DATE-ISSUED: April 9, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Lohner; Herbert	Friolzheim			DE
Dominke; Peter	Bietigheim-Bissingen			DE
Cao; Chi-Thuan	Korntal-Muenchingen			DE
Leimbach; Klaus-Dieter	Moeglingen			DE
Harter; Werner	Illingen			DE
Hommel; Mathias	Wolfsburg			DE

US-CL-CURRENT: 701/96; 701/200, 701/36, 73/178R

ABSTRACT:

The invention concerns a system for automatic following guidance, particularly for heavy-traffic automatic following guidance, of a motor vehicle (1), designed to ease the burden on the driver in heavy-traffic situations both by taking over lateral guidance by means of an automatic steering regulation system and by maintaining a set distance from a leading vehicle. The latter function requires an adaptive cruise and braking regulation system with "stop" and "go" function. According to the invention, selection and decision means (5, 6, 7, 8, 9) are provided that select both the regulating parameters and the types of controllers [sic], e.g., following guidance of the motor vehicle (1) on the basis of lane markings recognized by means of a video camera or on the basis of a recognized leading vehicle. The system is divided into hierarchical levels I-IV, the driver always being in the monitoring and adaptation loop assigned to the top level IV of the hierarchy, so that he has the highest priority and can override the system at any time.

17 Claims, 2 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 2

L17: Entry 10 of 18 File: USPT Apr 9, 2002

US-PAT-NO: 6370452
DOCUMENT-IDENTIFIER: US 6370452 B1

TITLE: Autonomous vehicle transit system

DATE-ISSUED: April 9, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Pfister; Samuel T.	Los Angeles	CA	90025	

US-CL-CURRENT: 701/23; 701/24, 701/25

ABSTRACT:

A transit system in an environment is provided that includes vehicles and communication nodes. The communication nodes contain information that is updated or re-written and sent to one or more vehicles. The information stored in the communication nodes provides data regarding the environment, communication node positions, vehicle communique, and vehicle control. The vehicles and the communication nodes communicate with each other. A vehicle by receiving the information from the communication nodes is able to move in the environment without complex sensors, to adapt to changes in the environment, to perform specific actions, and to communicate to other vehicles. Also, a vehicle by updating the information in the communication nodes is able to update out-dated information and to affect the actions and movements of other vehicles.

26 Claims, 11 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 10

L17: Entry 10 of 18 File: USPT Apr 9, 2002

DOCUMENT-IDENTIFIER: US 6370452 B1
TITLE: Autonomous vehicle transit system

Application Filing Date (1):
19991208

Brief Summary Text (5):
To facilitate and enhance an autonomous vehicle's ability to navigate an environment, especially a moderately complex and irregular environment, communication nodes such as beacons are generally utilized. Conventionally, beacons are placed in predetermined positions in the environment that are known to the autonomous vehicle. Beacons may be passive or active and often contain unique coded information that enables the autonomous vehicle to distinguish one beacon from another. The unique coded information is associated with a position in the environment that is known by the autonomous vehicle. Hence, when a beacon is detected, the autonomous vehicle uses a lookup table to correspond the coded information with a position in the environment. The detection and analysis of a single or multiple beacons allows the vehicle to determine its own position in a global reference frame or map of the environment.

Brief Summary Text (6):
However, the described beacon based navigation system requires that each autonomous vehicle have access to a pre-established map of the environment with the positions of the beacons recorded in the map. For example, Taivalkoski et al. (U.S. Pat. No. 4,821,192) describes a node map system for a vehicle and Kadonoff et al. (U.S. Pat. No. 4,829,442) describes a beacon navigation system for guiding a vehicle. The pre-established map is either stored in an on-board memory of each vehicle or transmitted to each vehicle from a central system using a wireless communication link. Both of these local and remote storage options, however, add complexity and cost to the autonomous vehicle. For instance, a change in the environment requires a change to the map, usually a manual change, which greatly limits the autonomy and extensibility of the vehicle navigating in a changing environment.

Brief Summary Text (16):
A feature of the present invention is that the node controller of the second one of the plurality of communication nodes updates its node memory with the transmitted positional information. An advantage of this feature is that the paths or links logically mapped out by an array of communication nodes is changeable without updating a central map and propagating the central map to all the vehicles. Furthermore, this feature illustrates the advantage that a central map is not needed.

Drawing Description Text (4):
FIG. 3A illustrates one embodiment of a speed calculation function for determining translational speed relative to the distance to a destination;

Drawing Description Text (5):
FIG. 3B illustrates one embodiment of a speed calculation function for determining steering speed relative to the angle to a destination;

Detailed Description Text (3):
FIG. 1 illustrates a block diagram of an abstract model of one embodiment of a transit system of the present invention. The abstract model includes a plurality of vehicles 5a-5c and communication nodes 19a-19d. For illustrative purposes, the number of vehicles and communication nodes are limited, as it should be recognized that the number of vehicles and communication nodes may be exceedingly numerous. Communication nodes 19a-19d are placed throughout an environment. The communication nodes are placed in the environment at predetermined locations manually or by a mapping vehicle. The mapping vehicle is an autonomous vehicle or a vehicle operated by an operator that uses a map or global reference frame that is loaded onboard the mapping vehicle. Utilizing the map, the mapping vehicle places the communication nodes in the environment at predetermined locations.

Detailed Description Text (4):
In the embodiment described, the vehicles 5a-5c are able to communicate with the communication nodes 19a-19d. By communicating with the communication nodes in the environment, the vehicles are able to traverse the environment autonomously or without operator assistance and without a map. For example, vehicle 5c broadcasts an initiate signal which is received and acknowledged by the communication node 19a. The communication node 19a transmits information to the vehicle 5c. In one embodiment, the communication node 19a is initially stored with information.

Detailed Description Text (5):
The information that is provided to the vehicle, in one embodiment, contains data concerning the location of another communication node. For example, the information from communication node 19a contains distance and angle measurements to the communication node 19d from the communication node 19a. By using the information received from the communication node 19a, the vehicle 5c is able to travel to the communication node 19d. Preferably, each of the communication nodes, e.g., communication nodes 19a-19d, within the environment contains data concerning the location of one or more neighboring communication nodes. Therefore, the vehicle 5c, for example, is able to traverse the environment by moving from communication node to communication node such as from communication node 19a to node 19d to node 19c and finally to node 19b. Similarly, as another example, vehicle 5a is able to traverse the environment by moving from communication nodes 19b to node 19c to node 19d and finally to node 19a.

Detailed Description Text (8):
In one embodiment, the vehicles 5a-5c, traversing the environment, transmits information to a communication node. For example, vehicle 5b transmits information to the communication node 19d. The communication node 19d stores the information provided by vehicle 5b. In one embodiment, the information provided by the vehicle updates previous information stored in the communication node. For instance, the vehicle transmits environment or location information to the communication node to update the current environment information or node location information stored within the communication node.

Detailed Description Text (9):
For example, if an object 11 is detected or otherwise made known to the vehicle 5b that was previously unknown to both vehicle 5b and the communication node 19a, the vehicle 5b transmits the location of the object 11 to the communication node 19a. The communication node 19a then updates the environment information stored in the communication node with the location or positional data of the object 11. Accordingly, if another vehicle, such as vehicle 5c, communicates with the communication node 19a, the communication node 19a is able to provide the updated environment information about the location of object 11 to vehicle 5c. Using the updated environment information, the vehicle is able to avoid or move to the object. Hence, as the environment changes, the updated environment information is capable of being communicated to the communication nodes and the vehicles. Therefore, the description of the environment is easily changed without any

modification to a central map or database. Accordingly, a tremendous amount of flexibility and ability to adapt to a dynamic environment is provided.

Detailed Description Text (10):
In one embodiment, information stored by the communication node 19d that was transmitted from a vehicle includes vehicle communiques, i.e., communication from one vehicle intended for one or more other vehicles or the vehicle itself. The vehicle communiques, in one embodiment, include information about a passing vehicle such as a unique identification number, a time in which the vehicle passed, destination or origination of the vehicle, mission, and/or cargo of the vehicle. Using the vehicle communique, another vehicle communicating with the communication node 19d is able to be affected by the information.

Detailed Description Text (17):
For instance, the communication device receives information transmitted by a communication node. The information contains data about the location of the communication node. The controller retains the information of location of the communication node including the location of a previous communication node and the vehicle's actual position. In one embodiment, the vehicle's relative location is determined by using sensors 23, such as odometric sensors, to track the distance and direction which the vehicle has traveled. Based on the positional information of the nodes and the vehicle's location, the controller 31 determines if any correction or adjustment is needed in regards to the vehicle's relative location, such as a correction in the vehicle's position and/or heading. If correction or adjustment is needed, the controller updates the vehicle's relative location. Such updating reduces the propagation of positional error and heading error as the vehicle moves throughout the environment.

Detailed Description Text (18):
In one embodiment, the controller 31 is configured to use a closed loop motion system in which vector distance to a destination is calculated and steering and translational speed is determined based on the calculated vector distance. In one embodiment, steering speed represents the velocity at which the vehicle is moving in an angular direction, i.e., turning. Translational speed, in one embodiment, represents the velocity at which the vehicle is moving forward or in reverse.

Detailed Description Text (19):
The positional location of a destination, e.g., a communication node, is received from another communication node. The distance to the destination from the vehicle is preferably measured in inches as an offset of the location of the destination in relation to the relative location of the vehicle. The angle to the destination is preferably measured in degrees as an offset of the location of the destination relative to the heading of the vehicle. Translational speed calculation function 151 and steering speed calculation function 155, as shown in FIGS. 3A and 3B, respectively, are utilized. The respective functions determine steer speed and translational speed using predetermined parameters and the measured angle and distance to the destination. The predetermined parameters include minimal distance 53a, minimal speed 51b, minimal steer speed 55b, maximum speed 51a, brake 57, and maximum steer speed 55a. A tradeoff between speed and accuracy of motion is controlled through the manipulation of these predetermined parameters.

Detailed Description Text (20):
The translational speed calculation function 151 to determine the translational speed is a linear relationship with the distance to the destination, as illustrated in FIG. 3A. As shown in FIG. 3A, a vehicle accelerates, i.e. changes translational speed, up to the maximum speed 51a as the vehicle approaches from a distance 53c from the destination. As the vehicle reaches a distance 53b from the destination, the vehicle slows down, i.e. changes translational speed, by reducing translational speed of the vehicle from the maximum speed 51a to the minimal speed 51b. In other words, the vehicle applies brake 57, which corresponds to the slope of the speed

calculation function 151.

Detailed Description Text (21):
In FIG. 3B, the speed calculation function 155 to determine the steering speed is a linear relationship with the angle to the destination. As shown in FIG. 3B, the steering speed of the vehicle is increased from a range delimited by a minimum steer speed 55b to a maximum steer speed 55a, for angles to the destination between 0 degrees to 180 degrees. For angles to the destination between 0 degrees to -179 degrees, the steering speed of the vehicle increases from a range delimited by a minimum steer speed 55b to a maximum steer speed 55a but in reverse.

Detailed Description Text (22):
Once the steering and translational speed or velocity are determined, in one embodiment, the drive control converts these velocities to angular and linear values in terms of motor and wheel motions to move the vehicle. For instance, for a vehicle having only two wheels, the drive control drives the motor to move or rotate the wheels to place the vehicle in motion. With respect to the linear values, the drive control moves the vehicle forward by rotating the wheels at a specific speed in one direction and in reverse by rotating the wheels at a specific speed in the opposite direction. With respect to the angular values, the drive control turns the vehicle by causing one wheel to rotate faster than the other wheel on the vehicle. When the vehicle gets close enough to a destination such that the distance is less than some threshold distance, then the controller determines that it has arrived at its destination.

Detailed Description Text (25):
Alternatively or in addition to, the controller is configured with one or more control commands to control the actions of the actuators. As such, at predetermined locations, times or conditions, the controller 31 is able to activate or control the actuators to perform a specific task. In one embodiment, the predetermined locations, times or conditions are provided by the information received by the communication device 29.

Detailed Description Text (26):
The vehicle control data could also resemble a computer program such that each node represents an instruction or a series of instructions by which the vehicle is operated in the environment. For example, referring back to FIG. 1, communication node 19d contains vehicle control data to pick up an object 11 and then move to communication node 19c. After picking up the object 11 and moving to communication node 19c, the vehicle communicates with the communication node 19c. Communication node 19c contains vehicle control data to command the vehicle to drop the object 11 at location 17a and to pick another object at location 17b. Therefore, the vehicle performs a series of commands that resemble a line by line execution of a computer program that could be stored on the vehicle itself. Hence, by distributing the storage of the instructions throughout the environment, the vehicle no longer needs to have an on-board computer program. Likewise, minimal or no mass memory is needed to store the on-board computer program. As a result, the cost of the vehicle is reduced as well as the computing power necessary to execute the on-board computer program.

Detailed Description Text (27):
Furthermore, the vehicle control data could also resemble a super command word such that each node is provided the super command word by a vehicle to command all the other vehicles in the environment. For example, communication node 19d initially contains vehicle control data to pick up an object 11. A vehicle 5a containing a super command word, e.g., return home, communicates with the communication node 19d. Communication node 19d updates the vehicle command data to include the super word command, return home. The vehicle 5a continues to other communication nodes in the environment and communicates the super command word to each communication node the vehicle 5a encounters. As other vehicles, e.g., vehicles 5b-5c, encounter and

communicate with the communication nodes containing the super command word, each vehicle receives and executes the super command word. Hence, if the super command word was a return home command, instructing all vehicles to return to a predetermined command central location, each vehicle would return without having to be individually instructed or individually located. Therefore, the super command word or any command is effectively propagated throughout the communication nodes in the environment. As a result, a tremendous amount of flexibility and adaptability in the control of one or more vehicles is provided.

Detailed Description Text (35):
FIG. 5 illustrates one example of the layout or data structure of the memory in the communication node of the present invention. In the memory, the unique identification number 61 of the communication node and the location of the node 63 in a world reference frame are stored. In other bit locations of memory, relative positions of other communication nodes 65-67 closest to the communication node are stored (e.g., X and Y integer values for the other communication nodes ranging from -7 to +7 feet). Environment data 69, e.g., the location of other objects, is stored in the next bits of memory. The other bits of memory store a destination pointer 71 pointing to the relative position of one of the other communication nodes. In one embodiment, control information 73 on how to update destination pointer 71 to point to another destination is stored in the memory. Additionally, the memory includes vehicle communique 77. Vehicle command data 75a used to inform a vehicle how to move and/or act is also stored in memory. The vehicle command data 75a, in one embodiment, also includes non-motion commands 75b. In one embodiment, the non-motion commands 75b trigger specific commands in a vehicle. In addition or alternatively, the non-motion commands are provided to a vehicle to be interpreted by the vehicle. The non-motion commands are for any non-motion functionality to be performed by a vehicle. In one embodiment, only the vehicle command data and the non-motion commands are capable of being modified.

Detailed Description Text (36):
Hence, as shown in FIG. 5, the communication nodes, specifically the memory included in the communication nodes, provide a large array of information. As previously mentioned, a vehicle capable of communicating to the communication nodes, is capable of reading and re-writing or updating the information contained with the memory. For example, if a vehicle has new information regarding the environment, such as a location of a new object, the vehicle transmits the environment information to the communication node. The communication node then updates the environment data 69. Similarly, if the vehicle has vehicle communique or vehicle control data, the vehicle can transmit the information to the communication node. The communication node then respectively updates the vehicle communique 77 or the vehicle control data 75a.

Detailed Description Text (37):
Furthermore, the vehicle by reading the communication node is provided with node position information regarding the location of a communication node 63 and relative positions of other communication nodes 65-67. Using the node position information, the vehicle is able to travel from one communication node to another communication node. Thus, the node position information resembles virtual links from one communication node to other neighboring communication nodes.

Detailed Description Text (38):
Also, a vehicle by reading the communication node is provided with a destination pointer 71 pointing to the relative position of one of the other communication nodes. Using the destination pointer, the vehicle is also able to travel from one communication node and to another specific destination communication node. However, the destination pointer resembles a predetermined path from one communication node to another communication node rather than a set of virtual links from one communication node to any one of a number of neighboring communication nodes. The control information 73 provides the vehicle or other vehicles the capability to

update the path. By utilizing the control information 73, a vehicle updates the destination pointer 71. Thus, the path can be changed, for example, referring to FIG. 1, from communication node 19a to destination communication node 19b to communication node 19a to destination communication node 19c.

Detailed Description Text (39):
As such, a communication node which is re-visited may direct a vehicle to a different destination than the previous destination directed by the communication node when the vehicle previously visited the communication node. For example, communication node 19d has a destination pointer providing the destination location of communication node 19c. The vehicle reads the destination information and before moving to communication node 19c, the vehicle communicates with the communication node 19d to update the destination pointer to point to communication node 19a. Hence, when the vehicle re-visits the communication node 19d, the vehicle reads the destination pointer and thus is directed to the communication node 19a instead of communication node 19c. Furthermore, as the environment changes, e.g., a communication node is added or removed, the vehicle is able to transmit the information regarding the removed or addition of a communication node to update the memory in the communication nodes. For instance, the destination pointer is updated and/or the relative positions of other neighboring nodes are updated. Therefore, virtual links or paths can be created and changed as a vehicle moves throughout the environment.

Detailed Description Text (44):
FIG. 8 illustrates an example of a star type search pattern initiated by the process in FIG. 7. The search pattern is initiated often when the error propagation from motion creates a large error that the vehicle does not move within range of the target communication node. In other words, the vehicle is unable to find a communication node. In FIG. 8, oval 81 represents error distribution elongated along the direction perpendicular to the vehicle's original heading 83. In other words, oval 81 represents the maximum probability that the actual destination, i.e., the communication node, is within the oval 81. If the vehicle does not find the communication node at point 85, the vehicle turns 90 degrees and moves to point 87. The perpendicular turn, i.e. the 90 degrees turn from point 85 to point 87, adjusts for the propagation of small angular errors that usually results in a positional error that can leave the vehicle to either side of the target communication node after the vehicle has traveled a large distance from the last communication node.

Detailed Description Text (46):
FIG. 9 illustrates a flow diagram detailing one embodiment of a detailed process operating in a transit system of the present invention. In step 81, the process sends a power signal and checks for a read signal. In one embodiment, the power signal is an electrical oscillation out of an antenna having a frequency of 50Hz. The read signal, in one embodiment, is the transferring of the entire memory contents of the communication node. In step 85, the process determines if the read signal is valid. If the process determines that the read signal is not valid in step 85, the process performs a search motion in step 83. In one embodiment, the search motion performed in step 83 is similar to the sub-process illustrated in FIG. 7. If the read signal is determined to be valid by the process in step 85, the process parses local transponder data received from a communication node in step 87. In step 89, the process updates the vehicle position using the parsed local transponder data. The process continues in step 91 to determines if actions are needed to be performed by the vehicle using the parsed local transponder data. In step 93, the process causes the vehicle to perform any non-motion actions, i.e., actions performed by the vehicle that does not require the vehicle to move. Once non-motion actions have been performed, the process, in step 95, determines if a motion command also needs to be performed. If a motion command does not need to be performed then the process ends. However, if the process determines in step 95 that a motion command needs to be performed, then the process in step 97 determines the

next destination from the local transponder data received in step 89 and the updated robot position in step 87. In step 99 the process causes the robot to move to the next destination determined (step 97). The process then repeats continuing to step 81 sending a power signal and checking for a read signal.

Field of Search Class/SubClass (6):
701/19

US Reference US Original Classification (3):
701/19

US Reference US Original Classification (22):
701/28

US Reference Group (3):
5053964 19911000 Mister et al. 701/19

US Reference Group (22):
5911767 19990600 Garibotto et al. 701/28

CLAIMS:

1. A transit system comprising:

a plurality of communication nodes, each of the plurality of communication nodes including:

a node memory able to store information,

a node communication device configured to receive information, and

a node controller coupled to the node memory and the node communication device;

a plurality of vehicles, each of the plurality of vehicles including:

a vehicle communication device able to transmit information, and

a vehicle controller coupled to the vehicle communication device, the vehicle controller configured to cause the vehicle communication device to transmit information to one of the plurality of communication nodes;

wherein the node controller of the one of the plurality of communication nodes is configured to update portions of the node memory with information from a first one of the plurality of vehicles;

wherein the node communication device of each of the plurality of communication nodes is further configured to transmit information, such that the information includes messages for a second one of the plurality of vehicles from a first one of the plurality of vehicles;

wherein the vehicle communication device of each of the plurality of vehicles is further able to receive information transmitted from the node communication device;

wherein the vehicle controller of each of the plurality of vehicles is further configured to interpret information transmitted from at least one of the plurality of communication nodes;

wherein the vehicle controller of each of the plurality of vehicles is further configured to manipulate each of the plurality of vehicles according to the

information transmitted;

wherein the node memory of one of the plurality of communication nodes stores information that includes position indicators and the node communication device of the one of the plurality of communication nodes transmits the position indicators;

wherein the position indicators include heading and distance parameters from the one of the plurality of communication nodes to another one of the plurality communication nodes;

wherein the position indicators further include reference values identifying a specific location of the one of the plurality of communication nodes relative to a center reference point;

wherein the vehicle controller of one of the plurality of vehicles is further configured to determine an absolute position of the one of the plurality of vehicles based on the transmitted position indicators;

wherein the vehicle controller of one of the plurality of vehicles is further configured to determine positional information of a first one of the plurality of communication nodes based on the absolute position of the one of the plurality of vehicles, and the positional information of the first one of the plurality of communication nodes is transmitted to a second one of the plurality of communication nodes, such that the node controller of the second one of the plurality of communication nodes updates its node memory with the transmitted positional information.

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Refine Search

Search Results -

Terms	Documents
L5 and @pd<=20030422	0

Database:
US Pre-Grant Publication Full-Text Database
US Patents Full-Text Database
US OCR Full-Text Database
EPO Abstracts Database
JPO Abstracts Database
Derwent World Patents Index
IBM Technical Disclosure Bulletins

Search: L8

Refine Search

Recall Text Clear Interrupt

Search History

DATE: Saturday, April 02, 2005 Printable Copy Create Case

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L7	L6 not l4	1	L7
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L4	L3 and @ad<=20030422	2	L4
L3	L2 and ((switch$ or chang$) with (auto$ with manual$))	2	L3
L2	L1 and (self$ same control$)	27	L2
L1	180/402,408,411.ccls.	356	L1

END OF SEARCH HISTORY

Hit List

Clear | Generate Collection | Print | Fwd Refs | Bkwd Refs | Generate OACS

Search Results - Record(s) 1 through 3 of 3 returned.

☐ 1. Document ID: US 6286615 B1

Using default format because multiple data bases are involved.

L6: Entry 1 of 3 File: USPT Sep 11, 2001

US-PAT-NO: 6286615
DOCUMENT-IDENTIFIER: US 6286615 B1

TITLE: Heavy vehicle for breaking up ground with retracting and steering rear wheels

DATE-ISSUED: September 11, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Bitelli; Romolo	40061 Minerbio (Bo)			IT

US-CL-CURRENT: 180/9.46; 180/411

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw. De

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☐ 2. Document ID: US 6209677 B1

L6: Entry 2 of 3 File: USPT Apr 3, 2001

US-PAT-NO: 6209677
DOCUMENT-IDENTIFIER: US 6209677 B1

TITLE: Steering system for non-tracked motor vehicles

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw. De

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☐ 3. Document ID: US 4077486 A

L6: Entry 3 of 3 File: USPT Mar 7, 1978

US-PAT-NO: 4077486
DOCUMENT-IDENTIFIER: US 4077486 A

TITLE: Power steering device for lift truck

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw D

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Terms	Documents
L5 and @ad<=20030422	3

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L4: Entry 1 of 2 File: USPT Apr 3, 2001

US-PAT-NO: 6209677
DOCUMENT-IDENTIFIER: US 6209677 B1

TITLE: Steering system for non-tracked motor vehicles

DATE-ISSUED: April 3, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Bohner; Hubert	Boeblingen			DE
Moser; Martin	Fellbach			DE
Schneckenburger; Reinhold	Rutesheim			DE

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
DaimlerChrysler AG	Stuttgart			DE	03

APPL-NO: 09/ 392650 [PALM]
DATE FILED: September 9, 1998

FOREIGN-APPL-PRIORITY-DATA:

COUNTRY	APPL-NO	APPL-DATE
DE	198 41 101	September 9, 1998

INT-CL: [07] B62 D 5/00

US-CL-ISSUED: 180/406; 180/405, 180/403, 180/402
US-CL-CURRENT: 180/406; 180/402, 180/403, 180/405

FIELD-OF-SEARCH: 180/402, 180/403, 180/405, 180/406, 180/407, 180/421, 180/446

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

Search Selected Search ALL Clear

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
5020618	June 1991	Nagao	180/403
5050696	September 1991	McGovern et al .	180/406
5056311	October 1991	Tischer	180/403
5263321	November 1993	Thomsen et al.	180/403

☐	5862878	January 1999	Bohner et al.	180/403
☐	5893427	April 1999	Bohner et al.	180/403
☐	5926676	October 1998	Ko	180/403
☐	6047788	April 2000	Bohner et al.	180/406

ART-UNIT: 361

PRIMARY-EXAMINER: DePumpo; Daniel G.

ATTY-AGENT-FIRM: Evenson, McKeown, Edwards & Lenahan, P.L.L.C.

ABSTRACT:

A steering system of a non-tracked motor vehicle whose steered vehicle wheels are connected in the normal operation with respect to the effect with a steering handle only by way of an electronic automatic control unit which continuously monitors itself with respect to a correct operation. As a function of a desired-value generator, which is operated by the steering handle, and an actual-value generator operated by the vehicle wheels, this automatic control system operates an adjusting drive for the steering adjustment of the steered vehicle wheels. In the event of a malfunctioning of the automatic control system, a forced coupling is automatically switched effective between the steering handle and the steered vehicle wheels. When the forced coupling is switched on, the steering system operates as much as possible in the manner of a conventional power steering system. In that event, the forces and torques transmitted between the steering handle and the steered vehicle wheels by way of the forced coupling are determined while utilizing the occurring elastic distortion of the forced coupling.

5 Claims, 3 Drawing figures

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L4: Entry 2 of 2 File: USPT Mar 7, 1978

US-PAT-NO: 4077486
DOCUMENT-IDENTIFIER: US 4077486 A

TITLE: Power steering device for lift truck

DATE-ISSUED: March 7, 1978

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Blakeslee; Thomas R.	Woodside	CA		
Francy; James R.	Los Gatos	CA		

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Logisticon, Inc.	Sunnyvale	CA			02

APPL-NO: 05/ 629490 [PALM]
DATE FILED: November 6, 1975

INT-CL: [02] B62D 5/04

US-CL-ISSUED: 180/79.1; 180/98
US-CL-CURRENT: 180/400; 180/168, 180/402

FIELD-OF-SEARCH: 180/98, 180/87R, 180/79, 180/79.1, 180/77R, 318/587

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

Search Selected Search ALL Clear

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
2317400	April 1943	Paulus et al.	180/79.1
2674331	April 1954	Ovshinsky	180/79.1
3003363	October 1961	DeHart	180/77R
3009525	November 1961	DeLiban	180/98
3039554	June 1962	Hosking et al.	180/79.1 X
3235024	February 1966	Barrett	180/79.1
3244250	April 1966	Barrett	180/79.1

☐	3245493	December 1966	Barrett	180/98
☐	3431996	March 1969	Giles et al.	180/98
☐	3468391	September 1969	Rushing et al.	180/98
☐	3482644	December 1969	Krieger et al.	180/79.1
☐	3498403	March 1970	Kohls	180/98
☐	3557893	January 1971	Kohls	180/79.1
☐	3667564	June 1972	Schnell	180/79.1
☐	3669205	June 1972	Brooke	180/79.1
☐	3669208	June 1972	Brooke	180/79.1
☐	3738443	June 1973	Kubo	180/98

FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	US-CL
435,079	September 1935	UK	180/79

ART-UNIT: 316

PRIMARY-EXAMINER: Peters, Jr.; Joseph F.

ASSISTANT-EXAMINER: Silverstrim; John P.

ATTY-AGENT-FIRM: Limbach, Limbach & Sutton

ABSTRACT:

A power steering device for a self-powered cargo-moving vehicle has a detented steering wheel which can be shifted by the operator to select either a manually operated, power steering mode, a manual override mode in which the guidance device is effectively disconnected and steering is undertaken by a direct mechanical linkage with the vehicle steering column, and, in one embodiment, an automatic, sensor-directed mode in which the vehicle is automatically guided to follow a magnetic wire path.

2 Claims, 15 Drawing figures

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L7: Entry 1 of 1 File: USPT Sep 11, 2001

US-PAT-NO: 6286615
DOCUMENT-IDENTIFIER: US 6286615 B1

TITLE: Heavy vehicle for breaking up ground with retracting and steering rear wheels

DATE-ISSUED: September 11, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Bitelli; Romolo	40061 Minerbio (Bo)			IT

APPL-NO: 09/ 531565 [PALM]
DATE FILED: March 20, 2000

FOREIGN-APPL-PRIORITY-DATA:

COUNTRY	APPL-NO	APPL-DATE
IT	VI99A0056	March 23, 1999

INT-CL: [07] B62 D 11/20

US-CL-ISSUED: 180/9.46; 180/411
US-CL-CURRENT: 180/9.46; 180/411

FIELD-OF-SEARCH: 180/9.44, 180/9.46, 180/9.48, 180/411, 280/98, 280/86, 280/103

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

Search Selected Search ALL Clear

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
3664448	May 1972	Hudis	180/9.46
3792745	February 1974	Files	180/9.46
4029165	June 1977	Miller et al.	180/6.48
4120507	October 1978	Miller	280/840
4387814	June 1983	Beduhn et al.	212/195

ART-UNIT: 369

PRIMARY-EXAMINER: Hurley; Kevin

ATTY-AGENT-FIRM: Dykema Gossett PLLC

ABSTRACT:

A machine for breaking up ground including, a frame supported by at least one pair of front wheels or tracks and by at least one pair of rear wheels or tracks. A driver's cab is made out of said frame and a means of breaking up the ground is connected to the frame. A traction system is supported by the frame and is for rotating one or more of the wheels or tracks. At least one rear wheel or track has a horizontal axis belonging to a chassis that is integral with said frame. The chassis is provided with at least one first actuator that works with maneuvering systems accessible from the driver's cab to rotate the rear wheel or track around a vertical axis while turning the front wheels or tracks of the machine.

11 Claims, 7 Drawing figures

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Refine Search

Search Results -

Terms	Documents
L11 and (gps$ or map$ or site or gate or destination or location)	2

Database:

US Pre-Grant Publication Full-Text Database
US Patents Full-Text Database
US OCR Full-Text Database
EPO Abstracts Database
JPO Abstracts Database
Derwent World Patents Index
IBM Technical Disclosure Bulletins

Search: L12

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Search History

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L9	6286615.pn. or 6209677.pn. or 4077486.pn.	3	L9
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L7	L6 not l4	1	L7
L6	L5 and @ad<=20030422	3	L6
L5	L1 and ((switch$ or chang$) with ((self$ or auto$) with manual$))	4	L5
L4	L3 and @ad<=20030422	2	L4
L3	L2 and ((switch$ or chang$) with (auto$ with manual$))	2	L3
L2	L1 and (self$ same control$)	27	L2
L1	180/402,408,411.ccls.	356	L1

END OF SEARCH HISTORY

L11: Entry 3 of 3 File: USPT Mar 7, 1978

DOCUMENT-IDENTIFIER: US 4077486 A
TITLE: Power steering device for lift truck

Brief Summary Text (3):
In the material handling industry, high-rise order picker vehicles (OPVs) permit narrow aisle storage and retrieval operations of nonpalletized case or item storage. Such OPVs carry an operator on a lifting platform who picks orders from either a pallet or a storage module. The lifting platform incorporates the vehicle control so the operator can ride on the platform. The aisle widths are extremely narrow and may be as narrow as four feet. It is thus desirable that the operator have accurate control of the vehicle's steering. Such control preferably involves a power steering mechanism but the cost of conventionally converting existing OPVs to power steering is quite high. Another problem is that in some circumstances it is preferable to allow the operator to override the power steering control, such as in some emergency situations. Some prior art built-in systems make no provision for this feature. The consideration of an automatic guidance mode raises still other problems.

Brief Summary Text (5):
There are basically two types of prior art guidance systems for OPVs. In the first type the OPV is mechanically guided. Rollers attached to the vehicle make contact upon aisle entry with steel rails bolted to the floor on either side of the aisle. The operator controls speed, stops and starts, and the vehicle is centered in the aisle mechanically. Although mechanical guidance systems offer economy and some degree of flexibility over the electronic guidance systems to be discussed hereinafter, the mechanical guidance systems have several disadvantages, such as high maintenance cost, rough operation, and excessive space requirements.

Brief Summary Text (11):
There are many advantages to the guidance system of the present invention. One advantage is that it has a low initial capital investment for the user. There is reduced damage to the equipment because there are no rails or rollers, such as in the mechanical-guidance system. Because it is an electronic guidance system, and therefore has less vibration and mechanical rattling, there is reduced damage to merchandise and to operators. Because of the increased accuracy of this system, the aisle space may be made even narrower than in some mechanical systems. A storage facility equipped with the guidance system of the present invention is much easier to clean because there are no projecting rails to interfere with floor cleaning operations. Unlike completely automated systems, however, the guidance system of the present invention has all the flexibility of mechanical guidance systems. For example, all that needs to be done to extend its operation is to lay more buried wire.

Detailed Description Text (4):
The description of the OPV 10 to this point has been of a conventional OPV. To modify the OPV 10 for the guidance system of the present invention, a sensing coil assembly 30 is mounted on the bottom surface of the OPV between the wheels 14 and 18 and along the axis of symmetry of the OPV 10. A second sensor 32 is mounted on

top of the indicator 28 to sense the angular position of the indicator 28. The OPV 10, when operating in the automatic guidance mode, straddles a buried wire 34 in the floor 36. The wire 34 is connected to a 6.3KHz line driver unit 38 which sends high frequency signals along the wire 34. As will be explained in greater detail hereinafter, the OPV 10 when operating in the automatic guidance mode is centered over the wire 34 and the sensing coil assembly 30, straddling the wire, picks up the wire signals and feeds them to an electronic guidance system. The guidance system, through a motorized unit to be described in greater detail hereinafter, rotates the ground-engaging steering wheel 14 through the conventional shaft 52 in a manner so as to steer the OPV 10 along the wire 34.

Detailed Description Text (5):
The layout of the wire 34 in a typical installation is depicted in FIG. 4, which shows the wire 34 serpentined through a plurality of storage aisles 40. The OPV 10 is manually power steered, in a manner to be described in greater detail hereinafter, into the storage facility until it approaches the wire 34 at which point the operator switches the guidance mechanism to its automatic mode as it is approaching the wire 34. When the OPV has either passed over the wire 34 and is heading away from it, or has come relatively close to the wire 34 and is heading away from it, the guidance system will electronically lock onto the wire and guide the OPV over the wire 34 and down between the storage aisles 40 until the operator stops the OPV 10.

Detailed Description Text (20):
The upper portion of elbow 154 of the actuator 148 is positioned to contact the push button of the switch 144 when the actuator 148 is rotated clockwise, as shown in FIG. 8. The lower portion of elbow 154 is positioned to contact the push button of the switch 146 as the actuator is further rotated clockwise as viewed in FIG. 8. The actuator 148 is caused to rotate clockwise when the plate 84 is moved in a downward direction as viewed in FIG. 8, corresponding to movement to the right in FIG. 7. As the actuator 148 is pivoted clockwise it first closes the switch 144 and as the plate 84 moves still further in the same direction, the switch 146 is operated. The switch 146 is a single pole, double throw switch which controls the switching from the manual to automatic modes. The switch 144 is a normally open, single pole, single throw switch which disconnects the power to the guidance system when the manual override mode is selected by the operator.

Detailed Description Text (22):
Referring to FIG. 15, the construction of the coil assembly is illustrated in greater detail. The coils, such as coil 158, are all mounted horizontally on a printed circuit board 157 by their leads 159. The coil leads are interconnected by the printed circuit in a manner to be described below. The side of the board 157 opposite to the coils is pressed hard against an assembly of sheets comprised of a sheet of rubber 161 1/8 inch thick, a 2-inch wide strip 163 of mu metal which is 0.006 inch thick, and a 1/8 inch thick strip 165 of cold rolled steel. The mu metal strip 163 provides a low reluctance, horizontal return path for the lines of flux 156 from the guide wire 34. This makes it possible to have a very thin sensor package. In one embodiment the sensor coils are 50 mHy. R.F. choke coils.

Detailed Description Text (25):
The amplifier signal L-R-FB from the output of the amplifier 176 is fed through a loop gain variable resistance 178 to one input of a synchronous detector 180. The amplified signal L'+R' from the output of the amplifier 170 is fed through a 6.3 KHz filter 182 to another input of the synchronous detector 180. The synchronous detector detects signals which are coherent to the reference signal, that is when the reference signal is less than 180.degree. out of phase with the error signal the synchronous detector integrates the error signal L-R-FB. When the reference signal is more than 180.degree. out of phase with the error signal the synchronous detector inverts and integrates the error signal L-R-FB. In this way spurious noise signals are averaged out to nothing. The output from the synchronous detector 180

is a DC signal whose magnitude is representative of the position error of the OPV 10 and whose polarity indicates on which side of the wire the OPV 10 is positioned. This output is fed through a 5 Hz low pass filter 184 to filter out any high frequency pulses and the output of the filter 184 is fed to a 0.1-1.2 Hz lead filter which introduces an approximately 60.degree. lead in phase to prevent oscillation in the feedback loop. The output from the lead filter 186 is fed to one terminal of a single pole double throw electronic switch 188.

Detailed Description Text (28):
Referring more particularly to FIG. 10 a waveform graph of the reference signal L'+R' and the error signal L-R is depicted with respect to the buried wire 34. As is readily apparent from the figure the reference signal has a slight dip in amplitude when the OPV 10 is centered over the buried wire 34. The error signal undergoes a zero crossing when the OPV 10 is centered over the wire 34. When the error signal and the reference signal lie on the same side of the abcissa they are in phase and when the error signal is on the opposite side of the abcissa the error and reference signals are out of phase. At the point where the OPV 10 is about to cross the wire the polarity of the output of the synchronous detector is changing from one polarity to another and the slope of the error signal is approaching zero. It is this condition which triggers the enable logic circuit 190 to activate the electronic switch 188 to connect the output of the lead filter 186 to the plus input of a summing junction 194. Until this condition is reached, the enable logic circuit 190 connects the power steering tachometer to the plus input of the summing junction 194. The manual-auto switch 146 is also connected to the enable logic circuit 190, thereby allowing the operator to manually cause the switch 188 to connect the power steering tachometer 46 to the summing junction 194 when the handwheel 74 is in its intermediate position. The enable logic circuit 190 also lights the "Auto" light 136 when the switch 188 is in the position connecting the lead filter 186 to the summing junction 194.

Detailed Description Text (36):
As was stated before, when the switch 146 is in the manual mode or when no threshold signal is present on the line 220, a logic high is placed on the corresponding input to the NOR gate 224. When this happens the NOR gates 224 and 226 act as a flip-flop in which the high input from the inverter 222 to the NOR gate 224 is an overriding reset. The result is that the output of the NOR gate 224 will be a logic low and the output of the NOR gate 226 will be a logic high regardless of the output of the exclusive OR gate 240. The logic low appearing at the output of the NOR gate 224 will cause the transistor 234 to become conductive to energize the LED 138. This same logic low will also cause the CMOS switch 228 to be open and, because of the inverter 230, the CMOS switch 236 will be closed.

Detailed Description Text (38):
If the switch 146 is switched to the auto position, as shown in FIG. 11, and a threshold signal appears on the line 220, the output of the inverter 222 will be a logic low. Assuming that the output from the exclusive OR gate 240 is also a logic low, indicating that the sign of the slope is not equal to the sign of the polarity of the synchronously detected error signal, and that the output of the NOR gate 224 continues to be a logic low, then the output of the NOR gate 226 will be a logic high. At this point, even though the switch 146 is at "AUTO", the OPV 10 will continue under the power steering mode until the signs of the slope and polarity of the modified error signal are equal. When this happens the output of the exclusive OR gate 240 will be a logic high, causing the output of the NOR gate 226 to be a logic low. With two logic lows to the input of the NOR gate 224 its output will change to a logic high and latch the flip flop.

Detailed Description Text (39):
A logic high at the output of the NOR gate 224 will cause the CMOS switch 228 to become conductive and the CMOS switch 236 to become non-conductive. The LED 138 supplied from the output of the inverter 230 will also be extinguished. Thus the

input signal to the amplifier 238 will be the guidance control input derived from the sensing coils and the OPV 10 will be steered automatically.

Detailed Description Text (40):
In order to determine the polarity and slope of the error signal the output of the amplifier 204 is fed to one input of an amplifier 242 whose other input is connected to the chassis ground and whose output is fed to one input of the exclusive OR gate 240. The output from the amplifier 204 is also fed to one input of a differential amplifier 244 and, through a resistor 246 to the other input of the differential amplifier 244. This other input is also connected to the circuit ground through a capacitor 248. The output of the amplifier 244 is supplied to the other input of the exclusive OR gate 240. The output of the amplifier 242 is representative of the polarity of the output of the amplifier 204 and the output of the amplifier 244 is representative of the slope of the same signal. When the OPV 10 has come sufficiently close to the buried wire 34 for the threshold signal to be established at the output of the amplifier 210 then the two amplifiers 242 and 244 together with the exclusive OR gate 240 will determine whether the sign of the slope of the error signal is equal to the sign of its polarity, indicating that the OPV 10 is going away from the wire. When this happens the output of the exclusive OR gate 240 will be a logic high.

Detailed Description Text (41):
It should be noted that the guide flip-flop made up of the NOR gates 224 and 226 is effectively a latching flip-flop. Once the flip-flop 224 has gone into the auto mode, it will only reset on a change in state of the signal applied from the output of the inverter 222, which indicates either that the switch 146 has been thrown to the manual mode or that the threshold signal has been lost. Provided the threshold signal is present and the switch 146 is in the auto position, no changes at the output of the exclusive OR gate 240 will affect the state of the flip-flop.

Detailed Description Text (43):
In operation, the input to the NAND gate 248 supplied by the switch 146 is a logic low. When the output of the NOR gate 224 also goes to a logic low, indicating that the guide flip-flop has somehow reset itself, then the output of the NAND gate 248 will become a logic high, triggering the alarm 254 through the transistor 252. An amplifier 256 having one lead connected through a diode 258 to the plus 12 volt source and its output connected through a resistance 260 to the base electrode of the transistor 252 will activate the alarm 254 if there is a power failure.

Detailed Description Text (50):
If any of the inputs to the NOR gate 314 is a logic high its output is a logic low and the transistor 294 will be conductive to forwardly bias the transistors 286 and 292. When the transistors 286 and 292 are forwardly biased, i.e. conductive, they short together the base and emitter electrodes of the transistors 296 and 308, respectively, making them non-conductive so that the motor will not run. As long as all the inputs to the NOR gate 314 are logic lows, its output will be a logic high and the transistors 286 and 292 will be non-conductive.

Detailed Description Text (51):
Assuming that the output of the amplifier 262 is a logic high, the output of the amplifier 272 will cause the transistor 288 to become conductive thereby making the PNP transistor 308 and the NPN transistor 300 conductive by connecting their base electrodes together through the resistor 290, which can have a value of 600 ohms, for example. It can be seen that this causes a current path to flow from the 24 volt battery source through the transistor 308, the resistor 198, the motor 44, the transistor 300 and the resistor 310 to the minus terminal of the battery. Thus the motor will run in a preordained direction determined by the path of current flow. Similarly, when the output of the amplifier 262 is the equivalent of a logic low, these same transistors will be turned off and, through the inverter 268 and the amplifier 278, the transistors 282, 304 and 296 will become conductive to supply

current to the motor 44, though in the opposite direction to cause the motor to rotate in the opposite direction. Thus, the polarity of the output of the amplifier 262 is determinative of the direction in which the motor will run. As will be described in greater detail hereinafter, the polarity of the output signal from the amplifier 262 depends on the polarity of the velocity command signal from the amplifier 238 as well as the output of the electronic tachometer 200. As explained above in reference to FIG. 9, the electronic tachometer 200 is connected in parallel with the motor and across the resistance 198. As shown in FIG. 12, these connections are made by way of lines 312, 320 and 322 connected to points 298, the junction of the motor and the resistor 198, and the point 306, respectively. The lines 312, 320 and 322 are the three inputs to the electronic tachometer 200, which is comprised of a differential amplifier 324 whose inputs are supplied by the lines connected to the motor and whose cutput is connected to the inputs of the amplifiers 262 and 264 other than the inputs connected to the output of the amplifier 238. As mentioned above, the outputs of the amplifiers 262 and 264 are supplied to the inputs of an exclusive OR gate 266. The exclusive OR gate acts as a controlled inverter whose output will be low whenever the absolute magnitude of the velocity command signal exceeds the absolute magnitude of the tachometer output signal, provided that the two signals are of the same polarity. If the two signals are of opposite polarity, then the output of the OR gate 266 will be low. For any other condition the output of the OR gate 266 will be a logic high with the result that the motor 44 will be turned off. The minimum time during which the motor 44 will be turned off is approximately 200 microseconds, which is determined by the circuit values within the multi-vibrator circuit 316. The duration during which the motor 44 will be turned on is determined by the length of time required for the output signal from the electronic tachometer 200 to match the velocity command signal from the amplifier 238. In order to guard against the possibility that a pair of series connected power transistors such as transistors 296 and 300 or 308 and 304 might be simultaneously made conducting, the parallel resistor diode circuits 276 and 270 together with their associated capacitors 280 and 274 insure that when there is a change in polarity of the velocity command signal that all the power transistors will be turned off before any other set is turned on.

Detailed Description Text (52):
A differential amplifier 326 has its two inputs connected in parallel with the resistor 310 to act as a torque limiting sensor to shut off the motor in the event that, because of some physical binding in the guide wheel mechanism, the motor is forced to draw an excess of current which would damage the motor. When the voltage across the resistor 310 increases beyond a predetermined value the output of the amplifier 326 reaches what amounts to a logic high which is fed to one input at the NOR gate 314. This logic high will cause the motor to be deenergized. Similarly, the power failure signal from the output of the amplifier 256 is also supplied to one input of the NOR gate 314 to shut off the motor in the event there is a failure in power to the guidance circuit.

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Refine Search

Search Results -

Terms	Documents
L16 and (gps$ or map$ or site or gate or destination or location)	18

Database:

US Pre-Grant Publication Full-Text Database
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Search: L17

Refine Search

Recall Text Clear Interrupt

Search History

DATE: **Saturday, April 02, 2005** Printable Copy Create Case

Set Name side by side	Query	Hit Count	Set Name result set
	DB=PGPB,USPT; THES=ASSIGNEE; PLUR=YES; OP=OR		
L17	L16 and (gps$ or map$ or site or gate or destination or location)	18	L17
L16	L15 and ((switch$ or chang$) with ((self$ or auto$) with manual$)) and @ad<=20030422	24	L16
L15	701/28,19,20, 22,23,24,25,51,93,95,206,120,121,207,223,41,201.ccls.	786	L15
L14	L13	718	L14
	DB=USPT; THES=ASSIGNEE; PLUR=YES; OP=OR		
L13	701/28,19,20, 22,23,24,25,51,93,95,206,120,121,207,223,41,201.ccls.	718	L13
L12	L11 and (gps$ or map$ or site or gate or destination or location)	2	L12
L11	L10 and (high$ or express$ or free$ or inter$ or intra$)	3	L11
L10	L9 and ((switch$ or chang$) with ((self$ or auto$) with manual$))	3	L10
L9	6286615.pn. or 6209677.pn. or 4077486.pn.	3	L9
	DB=PGPB,USPT; THES=ASSIGNEE; PLUR=YES; OP=OR		
L8	L5 and @pd<=20030422	0	L8

L7	L6 not l4	1	L7
L6	L5 and @ad<=20030422	3	L6
L5	L1 and ((switch$ or chang$) with ((self$ or auto$) with manual$))	4	L5
L4	L3 and @ad<=20030422	2	L4
L3	L2 and ((switch$ or chang$) with (auto$ with manual$))	2	L3
L2	L1 and (self$ same control$)	27	L2
L1	180/402,408,411.ccls.	356	L1

END OF SEARCH HISTORY

L17: Entry 7 of 18 File: USPT Nov 19, 2002

DOCUMENT-IDENTIFIER: US 6484077 B1
**** See image for Certificate of Correction ****
TITLE: Mobile vehicle travel control system

Application Filing Date (1):
20000731

Brief Summary Text (12):
Next, another conventional technique with regard to the operational control of the assembly carrying vehicle will be described below. At first, a plurality of fixed indication plates are installed on a predetermined orbit on which the assembly carrying vehicle moves. The indication plates are fixedly installed on a floor. A sensor is mounted in the assembly carrying vehicle to detect the indication plate. When detecting one of the plurality of indication plates by use of the sensor, the assembly carrying vehicle acquires an operation pattern data at the detected location. The operation of the assembly carrying vehicle is defined by the operation pattern data from an external unit. The assembly carrying vehicle carries out an operation to retain or maintain a tact pitch distance, a cornering operation or a constant speed operation, until detecting a next one of the plurality of fixed indication plates by use of the sensor.

Detailed Description Text (47):
The operation status data 3006 indicates an operation status of the assembly carrying vehicle 300. The operation status data is composed of a selection switch, a status data, a high speed dog data, a corner dog data, a fixed indication plate number data, a lifter height data and a start wait position data. The selection switch indicates a control status selected in the assembly carrying vehicle 300, and takes any one of a non-operation, an automatic control and a manual control. The status data indicates a running status of the assembly carrying vehicle 300, and takes any one of an automatic stop and an automatic running. The high speed dog data indicates a status of whether or not the assembly carrying vehicle 300 is running at a high speed. The corner dog data indicates a status of whether or not the assembly carrying vehicle 300 is running on a corner. The fixed indication plate number data is composed of a data indicative of a process being currently carried out and the data corresponds to a process data in the operation table 316. The lifter height data indicates a current height from a floor to a platform on which the assembled automobile is mounted. This data corresponds to the lifter height data 1105 of the operation table 316. The start wait position data indicates a status of whether or not the assembly carrying vehicle 300 is currently located at a start wait position.

Detailed Description Text (53):
Next, the roaming control section 352 carries out the roaming operation if the electric field intensity of a reception signal sent from the communicating access point AP 200 is lower than a threshold value. At this time, the roaming control section 352 first uses each of the access points AP 200 loaded from the high speed roaming table 221 of the communicating access point AP 200, as roaming destination candidates. Then, the roaming control section 352 measures the electric field intensity of a reception signal sent from each access point AP 200. Subsequently, the roaming control section 352 selects one having a maximum measured electric

field intensity of the reception signal among the roaming destination candidates and sets the selected access point AP 200 as the communicating access point AP 200.

Detailed Description Text (79):
The plurality of access points AP200 are arranged such that the communication between the control apparatus 100 and the assembly carrying vehicle 300 is always possible through the access points AP 200. At this time, any location of the assembly carrying vehicle 300 on the orbit 400 is included in at least one cell area.

Detailed Description Text (80):
FIG. 13 shows an arrangement example of the plurality of access points AP in the assembly carrying vehicle running control system of the present invention. Six access point AP 201, 202, 203, 204, 205 and 206 are arranged in this arrangement example. The six access point AP 201, 202, 203., 204, 205 and 206 have cell areas 211, 212, 213, 214, 215 and 216, respectively. Any location along the predetermined orbit 400 on which each assembly carrying vehicle 300 moves is included in at least two cell areas. Each assembly carrying vehicle 300 has the communicating unit 350, and uses the communicating unit 350 to carry out the radio communication with one of the plurality of access points AP 200.

Detailed Description Text (89):
Otherwise, the plurality of access points AP 200 may be arranged such that any location in a closed space in which the assembly carrying vehicles 300 are present is included in at least one cell area. The closed space may be the whole automobile assembling line or the like. Also, it is possible to avoid the communication from being substantially interrupted even when the assembly carrying vehicle 300 is present in the closed space such as an automobile assembling line.

Detailed Description Text (140):
The six access point AP 201, 202, 203, 204, 205 and 206 have the cell areas 211, 212, 213, 214, 215 and 216, respectively. Any location along the predetermined orbit 400 on which each assembly carrying vehicle 300 runs is included in at least one cell area. Each assembly carrying vehicle 300 has the communicating unit 350 and a high speed roaming table 354, as described above. The assembly carrying vehicle 300 carries out the radio communication with one of the plurality of access points AP 200 using the communicating unit 350. Each assembly carrying vehicle 300 communicates with the access point AP 200 having an electric field intensity of a reception signal equal to or greater than a preset threshold value among the plurality of access points AP 200.

Detailed Description Text (147):
It is determined whether or not the maximum of the electric field intensities of the reception signals measured at the step S55 is equal to or higher than the predetermined threshold value (Step S56). If Y at the step S56, the assembly carrying vehicle 300 switches a communication destination from the currently communicating access point AP to one of the adjacent access points AP which has the maximum reception signal electric field intensity (Step S57). This operation is a high speed roaming operation.

Detailed Description Text (148):
On the other hand, when all the electric field intensities of the reception signals measured at the step S55 are lower than the predetermined threshold value (Step S56), the assembly carrying vehicle 300 measures the electric field intensity of a reception signal from each of the access points AP 200 which are previously registered in the roaming table 355. Then, the assembly carrying vehicle 300 switches the communication destination from the currently communicating access point AP to one of the access points AP 200 having the maximum reception signal electric field intensity (Step S58). This operation is a normal roaming operation.

Detailed Description Text (155):
The high speed roaming operation and switching operation to the access points AP are carried out by the assembly carrying vehicle as follows. That is, if the communicating access point AP does not satisfy a communicable condition, the communicating unit 350 of the assembly carrying vehicle 300 determines one access point AP having the strongest electric field intensity of a reception signal from among the existing access points AP. Then, the communicating unit 350 of the assembly carrying vehicle 300 switches the communication destination to that access point AP if the electric field intensity of the reception signal from that access point AP satisfies the connection condition.

Detailed Description Text (169):
As a modification of the assembly carrying vehicle running control system, a case is supposed that the assembly carrying vehicle 300 does not run on the predetermined orbit but runs freely within any preset closed space. In this case, it is supposed that a plurality of access points AP 200 are arranged such that they can communicate with the assembly carrying vehicle 300 at any location within the closed space. The modification makes it possible for the assembly carrying vehicle 300 to always communicate with the control apparatus 100.

Detailed Description Text (172):
FIG. 13, again shows an arrangement example of the plurality of access points AP 200 in the assembly carrying vehicle running control system of the present invention, as described above. The six access point AP 201, 202, 203, 204, 205 and 206 are arranged in this arrangement example. The six access points AP 201, 202, 203, 204, 205 and 206 have respectively corresponding cell areas 211, 212, 213, 214, 215 and 216. An optional location along the predetermined orbit 400 on which each assembly carrying vehicle 300 moves is contained in at least one cell area. Each assembly carrying vehicle 300 has a communicating unit 350, and uses this communicating unit 350 to carry out the radio communication with one of the plurality of access points AP 200.

Detailed Description Text (183):
Also, the plurality of access points AP200 are arranged so as to always permit the communication with the assembly carrying vehicle 300. At this time, any location of the assembly carrying vehicle 300 along the orbit 400 is contained in at least one cell area. Otherwise, the plurality of access points AP 200 may be arranged such that any location of the assembly carrying vehicle 300 in a closed space such as the whole of the automobile assembling line is contain in at least one cell area.

Detailed Description Text (193):
The assembly carrying vehicle 300 detects the indication plate 402 by use of the indication plate detection sensor 362. At this time, for example, the indication plates 402 are provided in such a manner that the interval between the indication plates 402 is wider at a location other than the corner 401 than the interval the indication plates 402 on the corner 401. Accordingly, the assembly carrying vehicle 300 can recognize the corner 401. Instead, the assembly carrying vehicle 300 may read a data recorded on an ID tag provided along the orbit to thereby recognize the corner 401. Otherwise, an operation table 316 may be stored in the assembly carrying vehicle 300 to indicate an operation at a predetermined position. In this case, the assembly carrying vehicle 300 can retrieve the operation mode data 1164 from the operation table 316 by use of a current position measured by the assembly carrying vehicle 300 as a key. Thus, the assembly carrying vehicle 300 can recognize the corner 401. Otherwise, the assembly carrying vehicle 300 may detect a predetermined indication is plate (not shown), which is provided along the orbit 400 and is different, by use of the indication plate detection sensor 362. Thus, the assembly carrying vehicle 300 can recognize the corner 401.

Issued US Cross Reference Classification (1):

701/19

Field of Search Class/SubClass (1):
701/20

Field of Search Class/SubClass (2):
701/19

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L17: Entry 11 of 18 File: USPT Dec 4, 2001

US-PAT-NO: 6327522
DOCUMENT-IDENTIFIER: US 6327522 B1

TITLE: Display apparatus for vehicle

DATE-ISSUED: December 4, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Kojima; Koichi	Hiroshima-ken			JP
Uemura; Hiroki	Hiroshima-ken			JP
Sasaki; Hidekazu	Hiroshima-ken			JP
Doi; Ayumu	Hiroshima-ken			JP

US-CL-CURRENT: 701/1; 348/115, 701/300, 701/96

ABSTRACT:

In a display apparatus for a vehicle, when an auto mode is selected, an obstacle closest to the vehicle is determined on the basis of data that represents an output signal from an obstacle sensor, the determined obstacle and a radiation heat source (pixel group) included in an image sensed by an infrared light camera are associated with each other, and only an image corresponding to the obstacle closest to the vehicle is displayed on a display (FIG. 2, S5-S7).

18 Claims, 34 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 31

L17: Entry 12 of 18 File: USPT Nov 6, 2001

US-PAT-NO: 6314358
DOCUMENT-IDENTIFIER: US 6314358 B1

TITLE: Brake control for vehicles, especially for rail vehicles and a method for controlling vehicle brakes

DATE-ISSUED: November 6, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Dorn; Wolfgang	Munchen			DE
Mayer; Alfons	Munchen			DE

US-CL-CURRENT: 701/70; 180/170, 303/138, 303/20, 701/20, 701/79, 701/93

ABSTRACT:

A vehicle brake control wherein a driver generated braking prompt signal is compared with a measured deceleration signal and, according to which, a correction signal is generated. The correction signal is processed with the braking prompt signal into an output signal. The correction signal is constantly maintained over one or more clock pulses when the value of the deceleration signal lies within a given value range or tolerance band. However, the correction signal is changed from one plus to the next when the instantaneous deceleration lies outside said tolerance band.

19 Claims, 2 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 2

L17: Entry 13 of 18 File: USPT Nov 6, 2001

US-PAT-NO: 6314348
DOCUMENT-IDENTIFIER: US 6314348 B1

TITLE: Correction control for guidance control system

DATE-ISSUED: November 6, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Winslow; Phillip D.	Hayward	CA		

US-CL-CURRENT: 701/23; 180/168, 701/26, 701/41

ABSTRACT:

A method and apparatus which allows for corrections to be made to the path of a vehicle when an automatic steering control feature of a guidance control system is in operation. A sensor is coupled to the steering system detects movement of the steering wheel by the operator. When the operator moves the steering wheel the logic of the correction controller adjusts the travel path of the vehicle to correspond to the movement of the steering wheel. In one embodiment the travel path is adjusted by instructions transmitted to the controller of the guidance control system. Correction of the travel path may also be obtained by the operation of a keypad or a joystick.

20 Claims, 6 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 6

vrap ?

correct sense

L17: Entry 14 of 18 File: USPT May 2, 2000

US-PAT-NO: 6058339

DOCUMENT-IDENTIFIER: US 6058339 A

TITLE: Autonomous guided vehicle guidance device

DATE-ISSUED: May 2, 2000

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Takiguchi; Junichi	Tokyo			JP
Sugie; Hiroshi	Tokyo			JP
Wakisaka; Tatsuya	Tokyo			JP
Yoshino; Kyoji	Yokohama			JP
Inoue; Fumihiro	Kawagoe			JP

US-CL-CURRENT: 701/28; 180/169, 318/587, 701/23

ABSTRACT:

When material transport was automated on a building construction site, in a conventional travel tape guide system, it was necessary to replace the tape when it became soiled or when changes were made to a travel route. As a result, the usage efficiency of a material transport vehicle could not be improved on the site due to the fact that changes are made to work floors as demanded by construction schedules. According to this invention, there is provided a sign which is easy to move and which is installed at a turning point or an unloading point on a work floor transport route. An image of the sign is obtained by an imaging device on an autonomous guided vehicle and operating instructions are recognized by image processing. This makes it possible to automate the setting of routes and the control of the vehicle.

14 Claims, 13 Drawing figures

Exemplary Claim Number: 6

Number of Drawing Sheets: 13

L17: Entry 16 of 18 File: USPT Apr 25, 2000

US-PAT-NO: 6053270

DOCUMENT-IDENTIFIER: US 6053270 A

TITLE: Steering angle correcting system in vehicle

DATE-ISSUED: April 25, 2000

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Nishikawa; Masao	Saitama			JP
Ishida; Shinnosuke	Saitama			JP
Hashimoto; Kenshirou	Saitama			JP

US-CL-CURRENT: 180/168; 701/41

ABSTRACT:

In a steering angle correcting system, a steering amount required to maintain a positional relationship of a subject vehicle to a road lane ahead of the subject vehicle is calculated in a steering amount calculating device based on outputs from a first detecting device for detecting the state of a lane of a road ahead of the vehicle or which the vehicle is traveling, and a second detecting device for detecting a current positional relationship of the subject vehicle to the road lane. A steering device is driven by a driving device mounted between a grasping portion of a steering wheel and the steering device so as to decrease the difference between a steering amount detected by a steering amount detecting device and a steering amount calculated in the steering amount calculating device. Whenever a driver's intention and the determination by the system are different from each other, a driver can operate the steering wheel to intervene in the steering. In addition, the driver can immediately intervene in the steering at all times, while normally maintaining a cooperating relationship with the system. Thus, the steering angle correcting system has a semi-automatic steering concept.

16 Claims, 22 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 22

L17: Entry 16 of 18 File: USPT Apr 25, 2000

DOCUMENT-IDENTIFIER: US 6053270 A
TITLE: Steering angle correcting system in vehicle

Application Filing Date (1):
19961101

Detailed Description Text (5):
On the other hand, the reducer 66 has a nature that it self-locks when the driver intends to drive the column 6 by a physical force from the steering wheel 5. The steering mechanism 30.sub.1 including such an irreversible transmitting mechanism ensures that even if an abnormality such as a breakage should be produced in an electric system, it is possible for a driver to steer the vehicle by operating the steering wheel 5. In addition, even when an automatic driving device stops the control, as described hereinafter, an automatic steering can be automatically switched over to a manual steering, and a more natural feeling during the switching time can be insured.

Detailed Description Text (45):
Even when the operation of the steering angle correcting device is stopped after completion of the lane change and the like, the automatic steering is basically shifted to the manual steering and hence, the steering feel at the shifting is natural, leading to an enhanced commercial property. Even according to a third embodiment which will be described hereinafter, this advantage can be easily achieved by additionally mounting a clutch which is adapted to be brought into an engagement upon the power failure and to be brought out of the engagement upon energization.

Detailed Description Text (61):
The worm gear 41 has a pin 46 provided at its circumferentially intermediate portion and protruding toward the housing half 37 of the housing 35, and switches 47 and 48 are fixed to the housing half 37 and have detection lever 47a and 48a for detecting the pin 46. The switch 47 is fixed to the housing half 37 at a location in which the pin 46 is detected by the detecting lever 47a immediately before abutment of the worm gear 41 against the limiting portion 36a of the housing half 36, thereby changing the switching mode. The switch 48 is fixed to the housing half 37 in a location in which the pin 46 is detected by the detecting lever 48a immediately before abutment of the worm gear 41 against the limiting portion 36b of the housing half 36, thereby changing the switching mode. Moreover, each of the switches 47 and 48 cuts off the supplying of the power to the servo motor 31 by changing the switching mode as a result of detection of the pin 46 by the detecting lever 47a, 48a. Therefore, in a state in which the servo motor 31 is normally operative, it is possible to prevent the worm gear 41 from abutting against the limiting portion 36a or 36b to produce a disadvantage such as that an over-current flows to the servo motor 31.

Detailed Description Text (67):
In this manner, the steering mechanism 30.sub.2 disposed between the steering wheel 5 and the column 6 is accommodated and disposed in the steering wheel 5, but even if the air bag module 18 is advanced when the air bag 20 of the air bag module 18 mounted to the steering wheel 5, it is necessary to avoid the contact of the air

bag module 18 with the steering mechanism 30.sub.2. To this end, the steering mechanism 30.sub.2 is disposed within the steering wheel 5 in a location near the column 6 to define a space 50 between the steering mechanism 30.sub.2 and the air bag module 18 which is in an inoperative state.

Detailed Description Text (73):
In each of the first and second embodiments, the structure in which the steering mechanism 30.sub.1, 30.sub.2 is accommodated within the steering wheel 5 has been illustrated. Alternatively, as evident from the description in the first and second embodiments, it will be understood that the steering mechanism may be disposed at any location between the grasping portion 5a of the steering wheel 5 and the steering device 8.

Field of Search Class/SubClass (8):
701/28

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L17: Entry 17 of 18 File: USPT Aug 17, 1999

US-PAT-NO: 5938710
DOCUMENT-IDENTIFIER: US 5938710 A
**** See image for Certificate of Correction ****

TITLE: Selectively operable industrial truck

DATE-ISSUED: August 17, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Lanza; Fabrizio	Cernusco Sul Naviglio			IT
Livon; Guido	Latisana			IT
Masciangelo; Stefano	Genoa			IT
Ilic; Marco	Reggio Emilia			IT
Bassino; Paolo	Savona			IT
Garibotto; Giovanni	Varazze			IT

US-CL-CURRENT: 701/50; 180/169, 187/224, 187/231, 414/274, 701/25, 701/28

ABSTRACT:

An industrial truck, in particular a counterbalanced front-forklift truck, is provided which can be operated both manually and automatically and has a fork to handle pallets and loads located thereon. The forklift truck is equipped for automatic operation with a control system which can be brought into active connection with the vehicle drive system, the vehicle steering system, the vehicle braking system or the movement control system for the fork. The truck further includes a system for the input and storage of possible travel routes and a transport task, a system for the autonomous determination of the position of the vehicle in the room, a system for the control of the movement of the vehicle as a function of its position in the room and of the predefined transport task, a system for detection of the presence, the position, and the orientation of a pallet, a system for the control of the movement of the fork and/or of the vehicle as a function of the position, the orientation of the pallet, and the transport task, and a system for the deceleration of the vehicle in the presence of obstacles.

23 Claims, 19 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 11

L17: Entry 18 of 18 File: USPT Mar 16, 1999

US-PAT-NO: 5884205
DOCUMENT-IDENTIFIER: US 5884205 A

TITLE: Boom configuration monitoring and control system for mobile material distribution apparatus

DATE-ISSUED: March 16, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Elmore; Thomas R.	Farmersville	IL		
Morton; Joel T.	Springfield	IL		
Steffen; Ronald W.	Springfield	IL		

US-CL-CURRENT: 701/50; 222/63, 701/35

ABSTRACT:

A control system for monitoring and controlling the operation of a mobile material distribution apparatus including at least one boom having a plurality of distribution nozzles or distribution ports located along its length for distributing material is disclosed. The control system monitors various sections of the booms and provides the user with a graphical representation of the operating states of the nozzles/distribution ports in each monitored boom section. By taking into account the actual operating states of each of the sections of the monitored booms, the disclosed control system provides more accurate mapping of the materials distributed by the controlled apparatus. In addition, the disclosed control system considers the operating states of any fence row nozzles disposed on the monitored booms in determining the amount of material to be supplied to the monitored booms to achieve a desired distribution rate.

19 Claims, 27 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 26